

National 5

Homework RE4

1. Solve these simultaneous linear equations:

(a) $3x + 2y = 1$

$4x - y = 5$

(b) $4p + 3q = 2$

$7p + 2q = -3$

2. A group of 25 people, adults and children, visited the *R.S.S. Discovery* at “Discovery Point”. Charges for entry were £5 for an adult and £2 for a child. The total entry charge was £95. How many adults, and how many children were in the group? Do not use “trial and error”.

3. A council decides to plant rowan and maple trees in a park. The trees are to be planted with a density of 720 trees per hectare. The council spends £1500 on the trees and decides to plant an area of 0.25 hectares. Rowan trees cost £7.50 each and maple trees cost £9 each.

Given that the council buys r rowan trees and m maple trees,

- (a) Explain why $m + r = 180$.
(b) Find another equation connecting m and r .
(c) Find the number of maple trees and the number of rowan trees bought by the council.
4. Seats on flights from London to Edinburgh are sold at two prices, £30 and £50. On one flight a total of 130 seats was sold. Let x be the number of seats sold at £30 and y be the number sold at £50.

- (a) Write down an equation in x and y which satisfies the above condition.

The sale of the seats on this flight totalled £6000.

- (b) Write down a second equation in x and y which satisfies this condition.
(c) How many seats were sold at each price?
5. (a) Express $a^{\frac{1}{2}} a^{-\frac{3}{2}} + a^{-\frac{1}{2}}$ without brackets in its simplest form.
(b) Express $\frac{1}{x-2} - \frac{1}{x} \frac{1}{x+2}$ as a single fraction in its simplest form.
(c) Simplify $\frac{x^2 - 4}{3x + 6}$, $x \neq -2$.
6. A manufacturer claims that his breakfast cereal contains at least 25% fruit. A 750g packet of the cereal is checked and found to contain 195g of fruit. What actual percentage of the cereal is fruit?
7. Solve each of the following inequalities:

(a) $5x + 3 \leq 2x + 27$

(b) $10z - 5 > 9z - 4$

(c) $2x + 7 \leq 5x - 14$

8. Solve each of these equations:

(a) $\frac{x}{2} = 4$

(b) $\frac{2x}{3} = 12$

(c) $\frac{x-1}{2} = 7$

(d) $\frac{y}{5} + 1 = 7$

(e) $\frac{t}{3} = \frac{1}{4}$

(f) $\frac{a-1}{4} = \frac{1}{2}$

9. The 4th term of each number pattern below is the mean of the previous three terms.

(a) If the first three terms are 1, 6 and 8, calculate the 4th term.

(b) When the first three terms are x , $x+7$ and $x+11$, calculate the fourth term.

(c) When the first, second and **fourth** terms are $-2x$, $x+5$ and $2x+4$, calculate the 3rd term.

10. (a) Express $x^2 - 6x + 10$ in the form $x - a^2 + b$.

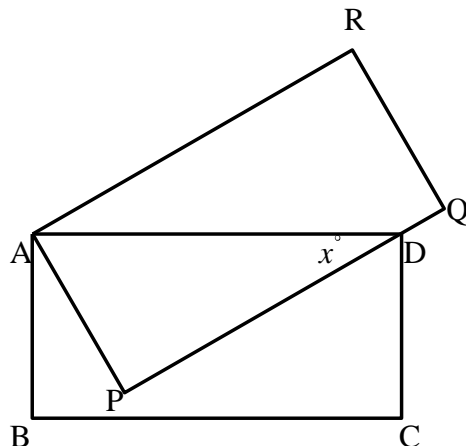
(b) Express $x^2 + x + 1$ in the form $x + a^2 + b$.

(c) Express $x^2 + 4x + 1$ in the form $x - a^2 + b$. Be careful with signs here.

11. In the diagram ABCD and APQR are CONGRUENT rectangles.

The side PQ passes through D and $\angle PDA = x^\circ$.

Find an expression for $\angle DRQ$ in terms of x .



12. A cylinder has radius $2x$ cm and height h cm.

A sphere has radius $3x$ cm.

Given that the two solids have equal volumes, express h in terms of x .

Use exact values and symbols. No decimals.

13. The n^{th} triangular number, T_n , is given by the formula $T_n = \frac{1}{2}n(n+1)$.

(a) Evaluate T_1 , T_2 and T_3 , drawing sketches to illustrate your answers.

(b) Evaluate T_{20} .

(c) Show that $T_{n+1} = \frac{1}{2}n^2 + 3n + 2$.

(d) Show that $T_n + T_{n+1}$ is a square number.